

project WEB

spring
2000

Connecting Projects WILD, WET and Learning Tree in New Hampshire

FUN WITH PHENOLOGY

When will the last frost be? Did the red-winged blackbird come back early this year? How long until the first lilac blooms?

Part of the pleasure of watching winter melt into spring is observing and celebrating the recurrence of events that mark the progression of the seasons. This study of the intertwining of the timing of natural events with seasons and climate is called phenology.

Phenology tracks cyclical phenomena (yes, the two words share the same root: the Greek *phainein*, to show), such as the migration or hibernation of animals, plant

growth and development, and emergence of various insects. Since the earliest times, phenology has helped humans decide when to plant, when to harvest, when to expect animals to migrate into or out of an area. For your students, it can be a valuable tool for learning to recognize and appreciate the interdependencies of the natural world. It can also provide a chance to learn and use a variety of skills, from simple observation to advanced statistical analysis.

PHENOLOGY continued on page 2

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WHAT'S HAPPENING TO THE FROGS?

In the summer of 1995, during a field trip to a farm pond in southern Minnesota, middle school students from New County School in LeSueur, Minnesota discovered large numbers of frogs with misshapen, extra, or missing limbs. Since then, reports of amphibian malformations from other parts of North America have drawn a great deal of public attention, not because malformed frogs are a new phenomenon, but because reports of malformations seem to be increasing above

the normal expected rate of occurrence.

During the summer of 1999, over 80 volunteers (ranging in age from 6 to 66), under the guidance of the NH Department of Environmental Services (NHDES), conducted 26 frog surveys around the state in an effort to document the extent of malformed frogs in New Hampshire. Lots of kids participated in the surveys with their parents or as part of a Boy Scout or Girl Scout project.

Of the 1,456 frogs collected during these surveys, approximately 6% showed some kind of malformation. For example,



This malformed specimen, nicknamed One-eyed Willy, was found in Ringee N.H.

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*For those who notice,
there is always a
certain sadness as the
days shorten. For those
who don't notice, there
is always a certain
sadness in not noticing.*

- Anonymous



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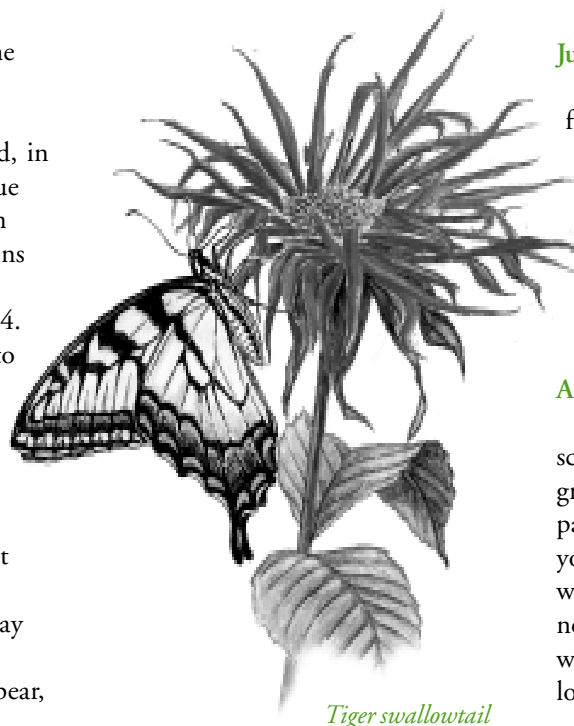
FROGS continued on page 4

EVENTS TO OBSERVE

Northern Woodlands magazine offers a terrific column on seasonal events to observe in our region. The following is excerpted, in part, from the Summer 1999 issue with permission. For information about complimentary subscriptions to this magazine, along with a teacher's guide, call 802-287-4284. The Northern Woodlands Goes to School program is serving 250 teachers throughout the Northeast.

June

Sapsuckers excavate new nest cavities, wild turkey eggs hatch, painted turtles and wood turtles lay eggs, lady's slippers bloom, wild strawberries ripen, June bugs appear, tiger swallowtail butterflies hatch.



Tiger swallowtail

July

Adult Japanese beetles emerge from ground, red-backed salamanders lay eggs, milkweeds flower, Monarch butterflies return, dragonflies emerge from underwater life, yellow warblers and northern water thrushes move south.

August

Katydid songs fill night air, male scarlet tanagers molt from red to green, young mink leave their parents, screech owls whinny as young establish territories, fall webworms appear near tops of trees, northern harriers depart for south, woodland asters bloom, barn swallows gather on telephone wires.

PHENOLOGY *continued from page 1*

How to begin

The most important supplies for beginning phenologists are their senses. Take your students outdoors. Have them concentrate on what they see, hear, smell, feel. Is there a strong south breeze? Are birds singing? Is there snow on the ground? Repeat the exercise a week later. What has changed?

Invite students to search for signs of spring and report them to the class. See who can come up with the most unusual ones: the first ant, the first duckweed, the first lightning. Write the observations on a special calendar so you can keep it and compare observations with future classes.

Anticipation

Brainstorm a list of springtime changes kids remember from years past. Have them estimate when they think they will happen. Post the list

with their predictions, then record when they actually occur. Some ideas of things to watch for are listed in the box.

Join the club!

Part of the fun of observing changes in nature over time is comparing dates with those from different years or different places. One way to watch spring march toward New Hampshire online is with Journey North. Students from all over the United States share their observations on phenological events, such as bird sightings and blossoms. Check it out at www.learner.org/jnorth.

You can also share your observations about spring through Did Spring SNAP?, a web-based collaboration with other classrooms. For more information about this program and SNAP's cyber-seasons program, see www.stolaf.edu/other/snap/spring.html.

Summer shift

Challenge your students to track changes over the summer, too. Talk about things they might find in their yards or at the park: clover blossoms, lightning bugs, cones appearing on evergreens, apples and plums ripening on ornamental trees, raspberries, thistle flowers, the first late-summer cicada buzz. Invite them to keep records and share them with you in the fall. Perhaps the students with the most observations could be rewarded with an invitation to your classroom as a "guest naturalist" when you talk about phenology the following year.

Reprinted with permission from Interconnections, spring/summer 1999, a joint newsletter from Minnesota Project Learning Tree, Project WET, Project WILD and Aquatic WILD.

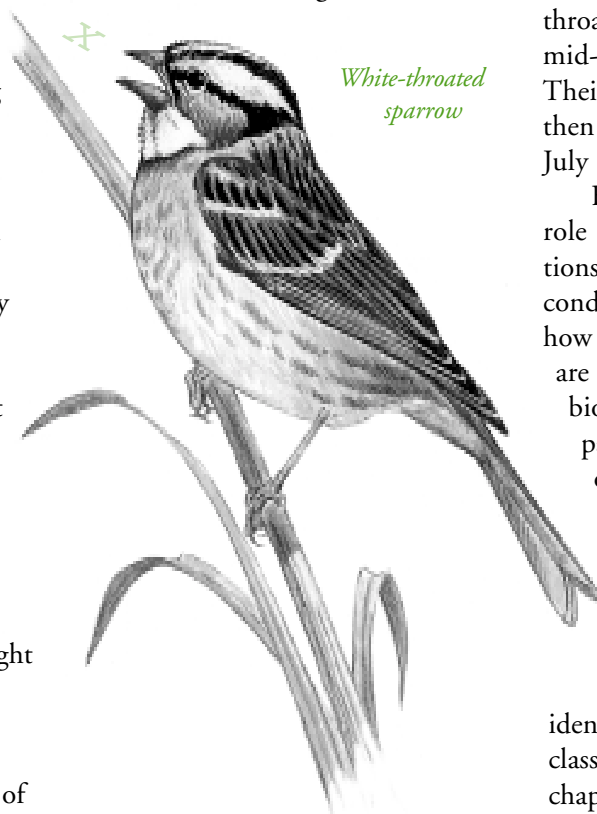
WHY DO BIRDS SING?

To answer this question, we must observe when birds sing and what other birds do in response to the singing. Birds sing the most in the spring. Migratory birds sing during migration and continue as they arrive in their breeding area; birds that winter in their breeding area may have been singing since midwinter when they sensed the days getting longer.

Female songbirds choose their mates only after the males have set up their territories. The largest territories are “owned” by the strongest males—those able to drive off other males with loud singing and chasing. The carrying power of the song lets other birds know that the singer is ready to fight if he must. Although we think of bird songs as being musical, the message other male birds hear is probably something like “Get out of my yard, or else.” Females, on the other hand, may hear “Come here. I would like to be your mate.”

Birds sing for other reasons, too. Each species of bird has a series of calls in addition to its songs. They are shorter and often directed to a specific bird or other animal. These calls tend to serve a specific function

and are not learned, but innate. For example, alarm calls alert all within earshot that danger is present; they tend to be similar among groups of birds and often communicate their message across species. Contact calls are used among members of a



White-throated sparrow

flock or between mates to indicate the location of the caller. Many species that lack song have complex repertoires of calls that serve varied functions.

Biologists and others interested in birds often keep track of when they hear a particular species begin to sing. In May, as the birds migrate through, you may hear some birds

you will hear at no other time. For example, in southern New Hampshire, you might hear white-throated sparrows in early May as they move to the nesting areas in the north. Meanwhile, people in northern New Hampshire will begin to hear white-throated sparrows as they arrive in mid-May to set up their territories. Their songs will intensify in June, then become less frequent during July and August.

Bird songs play an important role in determining bird populations. Breeding Bird Surveys are conducted every year to determine how many and what kind of males are singing on a specific route. A biologist or avid birder drives a particular road, stopping every so often for five minutes to record everything they hear. These records are used to determine population increases and declines. They can also provide indications of changing habitat.

If you want to learn how to identify birds by their calls, take a class with your local Audubon chapter, go out with an experienced birder, or listen to tapes. Set yourself a goal of learning five to ten calls per year. You may be surprised by how many you already know. And don't forget to get up early! Birds are most active just after dawn. Keep your ears open and enjoy the music of the spring.

Activities Related to Articles in This Issue

Project Learning Tree Suggests

In *Adopt-a-tree*, students monitor changes in an adopted tree, as well as its relationship to other living and non-living things.

The activity *Bursting Buds* has students observe and describe the stages that buds go through as leaves develop throughout the year.

Project Wild Suggests

In *Migration Barriers*, students draw murals showing deer migration routes and the consequences of the development of a highway near the area.

Using *Wild Edible Plants*, students create a local seasonal calendar identifying native edible plants and their uses.

Project Wet Suggests

Life in the Fast Lane uses a scavenger hunt for students to investigate temporary wetlands in their area.

In *A House of Seasons*, students construct a collage to observe the role of water in each of the seasons.

FROGS *continued from page 1*

frogs were found with missing or underdeveloped limbs and missing eyes. These results will be added to data compiled by the North American Reporting Center for Amphibian Malformities (NARCAM) from other states. The results are also available through their website at www.npwrc.usgs.gov/narcam.

Speculations abound as to what is causing these frog malformations. Determining a cause is difficult because frog eggs are virtually unprotected and readily absorb all sorts of materials in the environment. The current debate, and much of the present research, is focused on either chemicals in the environment that are interfering with hormones that affect growth and development, or parasites that may burrow into frogs, damaging cells and stunting development.

Related Monitoring Projects

The NORTH AMERICAN AMPHIBIAN MONITORING PROJECT (NAAMP) seeks to track amphibian populations over time. Throughout the world, many species of amphibians are in decline, with some disappearing altogether. Scientists are concerned because amphibians are an indicator species that tell us about the health of the environment as a whole. For more information, contact the N.H. NONGAME PROGRAM at 271-2461 or click on to www.im.nbs.gov/amphibs.html.

Another worthy project is monitoring vernal pools. These temporary pools of water emerge in the spring and support the mating and early life stages of several amphibian species. If you would like more information on studying vernal pool, or are already investigating them with your students, please call Marian Baker at 478-5650 or e-mail her at mbaker@monad.net.

The malformed frog issue presents an ideal opportunity for students to observe science in the making, from how data is collected to how hypotheses are formed and tested. Ideas for a frog curriculum are available on the web at <http://scope.educ.washington.edu/frogs/>.

For students and teachers who wish to participate in a frog survey, NHDES will be holding seminars to train volunteers in proper survey techniques (see schedule below). Surveys will be conducted this summer when frogs are in their metamorph stage. If you are interested in participating in this project (both adult and children volunteers are welcome), please contact Angie Archer at 271-8800 or aarcher@des.state.nh.us.



Volunteers wade through prime "frog-hunting" territory.

Schedule of Malformed Frogs Training Workshops

June 19: 9 a.m. to 12 noon at NHDES, 6 Hazen Drive, Concord, N.H.

June 20: 7 p.m., Jefferson, N.H., Location TBA.

More workshops will be scheduled. Call Angie for more information!

Guidelines for Amphibians and Reptiles in the Classroom

Spring is a time when many of you may consider having animals in your classroom. Keeping amphibian eggs can be an important part of some curricula. Your students may also bring in reptiles or amphibians because they are easy to catch. Here are important guidelines on what to do with reptiles and amphibians.

1. Never keep turtles taken from the wild in the classroom. Most turtle species are protected and it is unlawful to have them in your possession. If a student brings you a turtle, request that the student return it to the exact spot where he or she found it.

2. If you order specimens from

commercial sources, you have two choices: Euthanize them when you are finished or keep them permanently in captivity.

3. Use only native amphibians in the classroom. Salamander and frog egg masses are readily available in vernal pools in the spring and students can easily find them.

4. Keep amphibians or their eggs for only a short time (4-6 weeks) and always return them to the exact spot where they were found.

If you have specific questions, please contact Carla Palashuk, Nongame and Endangered Species Program, N.H. Fish and Game Department at 271-2462 or cpalashuk@wildlife.state.nh.us.

Do You Remember When...?

Keeping a nature journal is a fantastic way for students to record their phenological observations or to simply reflect on their feelings and thoughts about what they are seeing and learning. In general, there are two kinds of nature journals: open-ended and structured.

Open-ended journals allow students to record their experiences, thoughts, and feelings about nature in whatever form they prefer. Students may write about feelings, compose poetry, or draw things they observe or imagine.

In structured journals, students follow a set format in making their entries. For instance, they might use the journal to record observations made during field sessions, summarize what they have learned from an activity, or maintain a reference file of important concepts. The structured approach is often used when recording phenological observations about weather events, plants, or animals.

The following are suggestions about specific types of information you may want students to track in a structured journal.



WEATHER INFORMATION:

- Date of last snow or last frost of spring.
- Date of first snow or frost of fall.
- Date a local lake or pond freezes in fall or ices-out in spring.
- Date of first spring rain; Daily time of sunrise and sunset.



PLANT INFORMATION:

- Bud opening.
- First leaf.
- First flower.
- 50% bloom.
- 90% bloom.




ANIMAL INFORMATION:

- Amphibians - first singing, egg laying, life stages.
- Birds - migration, first sitings, mating rituals, or nesting dates.

UNH Launches New M.A. Program in Environmental Education

The UNIVERSITY OF NEW HAMPSHIRE is offering a new M.A. Program in Environmental Education. This graduate experience will prepare environmental educators to integrate and put into practice the three focus areas of the program:

 *Pedagogy*: an understanding of teaching as a critical, self-reflective, and inquiry-based activity, collaboratively undertaken in diverse communities

/ *Environmental Science*: an understanding of the physical and biological processes and relationships that constitute ecosystems

/ *Human Patterns and Environmental Transformations*: an understanding of the social (e.g. economic, political, institutional) and ethical dimensions of environmental policy.

The program will include an intensive, four week Summer Institute that integrates fieldwork/research methods, environmental policy/systems thinking, and curriculum development/assessment. Students will pursue an individually designed course of study that integrates course offerings from various academic departments on the UNH campus. The capstone experience of the M.A. Program in Environmental Education is a field-based practicum and the development of a portfolio. Applications can be requested from UNH GRADUATE SCHOOL at (603) 862-3000. For more information, contact Prof. Eleanor Abrams at (603) 862-2990 / eleanor.abrams@unh.edu or Prof. Scott Fletcher at (603) 862-3445 / esf@hopper.uhn.edu.

- Insects - dates of life stage cycles or appearance/emergence of.
- Mammals - dates of hibernation, mating rituals, birth of young

As a way to track observations of the entire class, record events on a large wall calendar. The calendar becomes a true phenological record if you use it over several years with different classes. To make it easier to compare, choose different ink colors to record events from successive school years. Once you have a few years recorded, students can analyze the timing of similar events over the course of several years.

ANNOUNCEMENTS

Teaching Fellowships

ORION SOCIETY TEACHING FELLOWSHIPS are designed to help teachers foster a sense of place through the study of local landscapes and histories, the reading of regional literature and by encouraging creative student responses to their communities. Orion is awarding year-long fellowships to elementary and secondary school teachers in the U.S. and Canada. The \$1000 stipends are to be put towards activities and resources that help achieve these goals. Some examples are field trips to local institutions and natural areas, guest speakers, native storytellers, and the purchase of supplies. For more information, contact Stories in the Land Teaching Fellowships, The Orion Society, 195 Main St, Great Barrington, MA 01230. On-line guidelines are available at www.orionsociety.org/teachfellow.html.

Virtual Field Trips

www.field-guides.com offers virtual field trips that allow students to visit a variety of hard-to-reach places, ranging from the inside of a volcano to the eye of a hurricane. Additional destinations include deserts, salt marshes, the underwater world of sharks, and a tour of the world's seven natural wonders. Each trip comprises a number of stops or websites with specific information. Teacher resources include a set of worksheets for each field trip as well as short teacher's guides and links.

Environmental Monitoring Projects

ENVIRONET is a network of teachers, scientists, environmental educators, and others who use telecommunications to enhance environmental science education. Much of their work is accomplished through environmental monitoring projects, with three levels of partici-

pation: entry-level, exploratory, and research. Timetables and short descriptions are given for different projects, along with detailed procedures for data collection and contact information. Topics include vernal pools, acid rain, plant diversity, ozone, and roadkill. For more information, consult their website at http://earth.simmons.edu/monitoring_projects/index.html.

PLT Coordinator Elected to National Board

New Hampshire's own PLT state coordinator has been elected by her fellow state coordinators across the country to the EDUCATION OPERATING COMMITTEE for the national PLT program. In this three-year position, Esther Cowles will be responsible for articulating the needs and interests of all the state coordinators regarding national program policy and curriculum development.

Correlation of PLT to State and National Standards Now On-line

PLT's curriculum materials are aligned with the state curriculum frameworks in English language arts, mathematics, science and social studies, as well as the national standards for science and social studies. Copies of the reports correlating PLT's activities to the standards are available in PDF format on the national PLT web site, www.plt.org. Hard copies are available from the NHPLT office for a nominal fee.

PLT and Girl Scouts

All PLT curriculum materials are now aligned with the GIRL SCOUTS program, from Daisy to Cadette. Copies of the report correlating these activities are available in PDF format on the national PLT web site, www.plt.org. Hard copies are available from the NHPLT office for a nominal fee.

UPCOMING EVENTS

JULY 1-8: Lakes Appreciation Week will honor one of our most precious resources...lakes! For more information and educational resources related to lakes, visit www.nalms.org.

JULY 1-16: Great American Secchi Dip-In is a chance for lay people to take a water clarity measurement from a local lake, using a secchi disk. Disks can be borrowed from NHDES or most local colleges or universities. For more information visit <http://dipin.kent.edu>

AUGUST 1-4 AND 7-11: Watershed Ecology Course is a hands-on course for educators, youth leaders, and others in watershed ecology. Topics include wetlands, streams and lakes, groundwater, plant communities, forest ecology, estuarine and marine ecology and

wildlife. Each day will include a classroom and field component. For more information, contact Sandy Point Discovery Center at 778-0015, rachel@greatbay.org, or water.resources@unh.edu.

AUGUST 11: New Hampshire PLT, WILD, and WET Facilitator Reunion offers a fun opportunity for current facilitators in one or more of the three projects to refresh their skills and learn more about education reform and how the programs can be used together. For more information contact Esther Cowles at 226-0160 or esther@nhplt.org.

SEPTEMBER 21-24: New England Environmental Education Alliance Annual Conference at the W. Alton Jones Campus, Rhode Island. For more information contact Bill Tyler at 401-949-5454.

ON THE H.O.M.E. FRONT

Teaching with the Seasons

Nature's daily and seasonal drama provides the textbook for this grade seven natural science course based on phenology.

BY LARRY WEBER

Those of us involved in environmental education face a formidable challenge. Environmental degradation continues even as we try to tell the next generation how unwise this is. Underlying the difficulty of finding ways to foster concern for the environment is the fact that the majority of the youth we are trying to reach have less interaction with and awareness of the natural world than any previous generation.

I believe part of our task as environmental educators is to fill in this gap in students' education and awareness, to give students a positive, healthy view of the planet, starting with the abundance and variety of nature nearby.

For the past 15 years I have been teaching a Natural Science course to seventh graders that seeks to do just that. The curriculum I developed is based on phenology. The students learn about local flora and fauna, track the weather, and closely monitor the progression of the seasons. Through the year, they

develop skills of observation and prediction, experience the excitement of recognizing trees, wildflowers and animal tracks, and become attuned to the environment generally. They come to see nature is not "somewhere else," but a dynamic presence in their daily lives.

DESIGN OF THE COURSE

The phenology natural science course operates around three conditions that make it unique: we do not use a textbook; we regularly use the outdoors as a classroom; and we follow the seasons' phenology as the curriculum.

Students bring two notebooks to class. One stays indoors, while the other becomes a field journal. We go outdoors on a weekly basis and, with the exception of two short bus trips, we make use of the school campus and nearby property for the entire year.

While always rewarding, going outdoors weekly is not without its difficulties. Students do not always come properly prepared for weather conditions, and their energy levels outdoors can be very taxing on the teacher. For these reasons, it is important to maintain a semblance of classroom structure. I have found taking students outdoors regularly from the beginning of the school year helps to establish a routine. And, as in the indoor classroom, we have a strict code of conduct involving how we act toward each other and how we treat organisms we find.

CLASS PROCEDURE

Regular class procedure revolves around the following five main components of the course: weather, months, Fall and Spring phenology charts, students' discoveries, and phenology topics.

A typical week

MONDAY: Discussion of present phenology; critter news, sharing students' discoveries; weather news; introduction to week's topic.

TUESDAY: Discussion of week's topic.

WEDNESDAY: Outdoor walk to look for evidence of present topic; students take notes and make sketches.

THURSDAY: Go over findings from walk; continue discussion of topic.

FRIDAY: Student's report summarizing walk and findings; quiz on topic.

PHENOLOGY TOPICS BY MONTH

The following topics are covered during the course of the school year.

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Seventh graders investigate meadow plants in search of insect life.

© SOIL CONSERVATION SERVICE PHOTO

Teachers attempting to use phenology-based methods will need to become aware of their own local weather and phenology.

SEPTEMBER: *The Cooling Month*

Mushrooms and other fungi; fall migration - raptors; fall wildflowers; deciduous trees.

OCTOBER: *The Leaf-Drop Month*

Insects; spiders; pond in fall; small mammals.

NOVEMBER: *The Cloudy Freeze-Up Month*

Non-flowering plants; animal signs; animal tracks.

DECEMBER: *The Dark Month*

Large mammals; winter birds; natural lights.

JANUARY: *The Cold Month*

Wildlife in winter weather; pond in winter; conifers.

FEBRUARY: *The Dry Month*

Humans in winter weather; winter wildflowers; deciduous trees in winter.

March: *The Crusty-Snow Month*

Sap flow; fish and streams in early spring; early spring things; tree flowers.

APRIL: *The Thawing Month*

Spring migration - water birds; frogs and other amphibians; the pond in spring.

MAY: *The Greening Month*

Spring wildflowers; spring and summer songbirds; lesser-loved critters.

The phenology-based Natural Science course has been very successful and has been adapted by colleagues for use with elementary, middle and secondary classes. Both students and parents have shared how observant they have become as a result of this class. They report family outings are now enriched with comments about local plants and animals.

By putting students in touch with nature on a daily basis, familiarizing them with local flora and fauna, and teaching and reinforcing the skills of observation, we can help them build the foundation of a lifelong appreciation of the richness of the natural world around them.

Larry Weber teaches science at The Marshall School in Duluth, Minnesota, and is the author of *Backyard Almanac: A 365-day guide to the plants and critters that live in your backyard.*

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